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AUTHOR Walter, Heather; Lien, Jon
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ABSTRACT

This document reports the results of a Canadian survey that questioned approximately 4,000 students and 200 teachers on marine related topics. The student population consisted of children from the fifth through ninth grades. Their questionnaire included items on: (1) attitudes toward the ocean, wildlife, and marine resource issues; (2) orientation toward marine management concepts; (3) knowledge about the marine enironment and human impact on the oceans; and (4) personal experiences with the ocean, either direct or indirect. The accompanying teacher questionnaire requested information on students' geographic and economic setting. Teachers were also questioned about their views on marine and aquatic education in their schools. Student responses indicated that knowledge levels were surprisingly low. Replies to attitudinal items reflected a utilitarian orientation towards the ocean by coastal students. Many identified the school as the most important source of information about the marine environment. However, the students with the highest knowledge scores reported that they learned most about oceans from television and direct experiences with the sea. Teachers responded positively to the need for more marine education in the schools (89 percent) and 99 percent indicated that their students find the ocean interesting. Data results are graphically presented. (ML)

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ATTITUDES OF CANADIAN STUDENTS AND TEACHERS TOWARD THE MARINE ENVIRONMENT AND MARINE EDUCATION

By Heather Walter and Jon Lien
Newfoundland Institute for Cold Ocean Science
and Department of Psychology
Memorial University of Newfoundland
St. John's, Newfoundland

"It is time that we learned to think about the present as a dynamically changing situation. If we wish to ameliorate the conditions of our life, we have to think far ahead in order to understand where we are going and to define whether we like our destination or not. If we do not like it, we must decide how we can take a different road at sometime in the future which, when we act, will be the present" (Doxiadis, 1967)

Consider the destination of the oceans of this planet. The development of the offshore oil and gas industry, increased trade and shipping, the fisheries, coastal zone development and many other human-related activities either in or on the ocean represent an accelerated pressure on its natural resources. It is clear that effective resource management policy is dependent upon widespread public interest and understanding (Department of Fisheries and Oceans, 1983; Task Force on Northern Conservation, 1984; Filion et al, 1983). But do we at present have such an informed, educated public in Canada?

Canada is a maritime nation with ten of its provinces and territories bordering on one of three surrounding oceans. Decisions made about the marine environment and management of human activities in this environment effect the entire population of Canada. But how much do Canadians know about their marine heritage? What are their attitudes toward these resources? How do they learn about oceans? What is the status of marine education in Canada? Is ocean literacy sufficient to equip Canadians to participate in and understand management decisions and thereby effect the oceans 'destination'.

In January 1985, answers to questions such as these were sought through a survey of approximately 4,000 students and 200 teachers from across Canada. A preliminary analysis of these survey results reveals several interesting trends and relationships. Relationships presented in this paper are statistically at the .01 level. Analysis of these data is still continuing. A complete presentation of these results will be made to Fisheries and Oceans Canada and when we've completed analysis of these data by province to each provincial department of education.

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QUESTIONNAIRE DESIGN The student questionnaire was developed for grade 5 and 9 students from schools in each of the provinces and territories. It was designed to be administered and supervised by randomly selected classroom teachers. Teachers who administered the survey also completed a separate questionnaire.

The initial student survey instrument was reviewed by individuals in areas of social psychology, education, resource management and marine research. It was then field tested on appropiate age children and revised based on feedback from all sources.

The final student questionaire contained 95 items and was divided into four major categories: (1) attitudes toward the ocean, toward different forms of wildlife, and toward marine resource issues, (2) orientation or viewpoints in relation to the ocean, its managment and its inhabitants, (3) knowledge about the marine environment and human impact on the oceans, and (4) personal experiences of the ocean, either direct or indirect. The content of the survey instrument focused predominantly on the ocean environment, however, many of the items contained conceptual relevance for fresh water systems also.

The accompanying teacher questionaire solicited information on students' geographic and economic setting to provide descriptive data on the groups surveyed. Teachers were also questioned about their views on marine and aquatic education in their schools.

SURVEY SAMPLING The selection of schools and teachers was made randomly. The number of schools chosen within each of the provinces was based on their percentage of the total Canadian population between the ages of 10 - 14 (Grades 5 - 9). A minimum sample of 15 schools per province was selected.

The overall response rate was 53% with a total of 121 schools (3890 students and 155 teachers) choosing to participate. In the cases of Quebec and francophone schools in New Brunswick, Prince Edward Island, Ontario and Manitoba the survey process was delayed somewhat because of the need to translate all correspondence and questionnaires from English to French. This delay may account for the lower response rates from these provinces. Table 1 presents the numbers of schools and students participating by province.

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Student Attitudes Students generally felt very positively about the ocean; 90% indicated the sea was "useful", 85% "nice", 83% "important, 85% "interesting. Students took a much less extreme positions on the state of the ocean; few said it was "clean" or "dirty" with the majority adopting a neutral attitude.

Students' proximity to the ocean effects their attitudes. About 70% of students that live within 100 km. of the ocean felt it was "useful" while only 57% of those living inland responded in the same way. Students living near the ocean also scored higher in indicating that the sea was "familiar"; inland students commonly perceived the ocean as "strange".

Figure 4 presents students' orientation to the ocean and the reasons they like or dislike it. A largest number of students felt the ocean was "a peaceful place" (35%) to sit and think and "be close to nature". The next most popular view of the ocean was as a "fun place" (23%). Only 2% of the students felt is was a "scary place".

Attitudes toward different marine wildlife varied. Marine mammals scored high in the "love" and "like" categories (over 80% for seals and about 60% for whales). Salmon (47%) and trout (49%) were also popular and commonly in the "love" and "like" categories. Sharks were liked by 32% of the students while eels were liked by only 17%. Terrestial mammals (wolf and bear) did not score as high a marine mammals with the exception of cats who received the same percentages of student favour as seals. Young marine mammals appeared to be only slightly favourved than older ones (seal pups 85%; seals 82% in "love" and "like" categories).

Students in grade 5 tended to be more enthusiastic in their opinions about animals than grade 9 students. Grade 5 students consistently had higher percentages in the "love" and "like" categories.

The reasons students gave for choosing a favourite animal are presented in Figure 6. Most commonly (29%) students selected an animal because it was "gentle and harmless", 27% of students liked animals for their "spirit and special personality". Only 7.4% made a choice of animal on the basis of their animal's edibility or saleability.

Marine Issues In general students responded with concern to marine issues. Respect for the marine environment was evidenced by 90% of the students concern for ocean and lake pollution. Only 55% recognized the need for fisheries regulations and 45% felt that offshore oil development might have negative impacts on the marine environment. There was a strong tendency for students to evidence a conservation/preservation ethic; 83% did not think that humans had the right to control marine species population levels; 70% believed that whales should be protected. Figure 7 shows that the majority of students (58%) chose, from six options, to develop an area of the coast as a wildlife sanctuary.

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Table 1: Schools and students sampled by province.

Province	N of schools selected	N of schools participating	Teacher N	Student N	% Response
Newfoundland	15	11	20	548	73
Nova Scotia	15	11	14	286	73
P.E.I.	15	12	20	561	86
New Brunswick	15	6	5	212	46
Quebec	20	7	7	194	35
Ontario	42	19	34	905	45
Manitoba	14	6	7	159	43
Saskatchwan	12	3	3	40	25
Alberta	24	12	16	365	50
British Columbia	28	15	16	410	54
Northwest Terr.	15	10	7	128	66
Yukon	15	9	6	82	60
Totals	230	121	155	3,890	53

The sample contained 49% grade 5 children, 51% grade 9 children. About 45% of the sample lived within 100 km. of the ocean, 10% 100-500 km. from the ocean and 45% over 500 km. from the ocean. Most of the children spoke english as their primary language (91%); only 9% spoke french.

RESULTS

Students' Knowledge Knowledge scores from the student questionaire varied only slightly from province to province. There was a general trend for a slightly higher score with higher grade level (Figure 1).

Lower knowledge levels were obtained by students living close to an ocean (within 100 km.) than by students living more than 500 km. inland. The highest knowledge scores were recorded by those living within a distance of 100 - 500 km. from an ocean (Figure 2).

The language of responding students appeared to make a slight difference in knowledge level with english students scoring slightly higher than french students (Figure 3).

The knowledge levels were in fact surprisingly low. About 70% of the total student population sampled could not understand a basic marine food chain. Only 30% of students knew that energy for marine life comes from the sun. Over 60% did not know what plankton was. And this basic lack of knowledge extends to geography as well. Only 18% of children answered corectly about the number of provinces and territories in Canada that border on oceans. Even for popular marine issues such as the harp seal hunt there was little information; 62% of the students sampled did not know the branch of the Canadian Government that managed the seal hunt.

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Students attitudes toward marine management issues were clearly affected by their grade level (Figure 8). Opinions from grade 9 students were substantially more polarized than were those from students in grade 5. Concern for ocean and lake pollution was about the same in both grades. In most cases, students in grade 5 responded with a higher percentage "not knowing" how they felt about specific issues.

Figure 9 indicates another trend in student attitudes which is dependent upon proximity to the ocean. Those living near the sea scored differently on most of the issue questions and indicated: less concern for fisheries regulation; greater belief in human rights to control population levels of marine animals; less belief in the need to protect whales and seals; less concern about lake pollution and coastal areas were less frequently perceived as areas for recreation. Students living near the sea however more frequently acknowledged human dependency on the sea, more interest in mariculture and greater concern over possible threats to marine life from offshore oil and gas activities. In general these results imply a more utilitarian orientation in coastal students toward the ocean.

Students' Experience There was a very high percentage of Canadian students that had contact with the marine environment, either directly or indirectly. A total of 75% of the students tested claimed to have visited the ocean within the past year and 60 % indicated that they had lived at least one year of their life near the sea. However the fact of being in close proximity to the marine environment does not imply a greater knowledge level in students, as shown in Figure 2.

Several factors which did effect a positive change in knowledge scores were (1) reading educational magazines such as "National Geographic", "Owl", "Chickadee" and (2) watching educational television programs such as "Wild Kingdom", "This Land" and "The Nature of Things".

Students frequently reported that their most important source of information about the marine environment was the school (Figure 10). However students with the highest knowledge scores reported that they learned most about oceans from television and direct experiences with the sea. Student knowledge about the marine environment was not significantly related to the presence or absence of marine education in their schools. Use of specific curricula were also not related to attitudes or knowledge scores. However, those students that were taught about the sea in school and were taken on field trips to either the ocean or an aquatic area did show higher knowledge levels.

About 70% of the students surveyed felt that it was important to study environmental issues in school; the majority of students chose oceans over any other aspect of the natural environment to learn more about; and of those students choosing an environment

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related career, 40% elected to work in the ocean environment.

Teachers' Attitudes Toward Marine Education. Because of their training, interest and occupation, teachers are in a good position to observe gaps in existing curricula and to have special knowledge of the educational needs of students. For those reasons, their opinions were also requested in this study to determine what is presently being taught in the area of marine education and what more could or needs to be done.

Almost all teachers reported that their students find the ocean interesting (99%) and 89% perceived the need for more marine education in schools. About 90% felt that learning about the marine environment would be of direct relevance to their students.

Presently 57% of the schools sampled teach about the marine or aquatic environment however only 16% use materials designed specifically for that curriculum area. There is a large disparity between those teaching marine education in grade 5 (73%) and in grade 9 (30%). Teachers in schools located near the ocean generally indicated a greater involvement in marine education. The exception to this trend, however, is that more inland teachers appear to involve their students in field trips to the ocean or an aquatic area (Figure 14).

Less than one-quarter of the teachers surveyed indicated that marine education was a "required" area of study, with an equal number indicating they taught it out of "personal interest". Figure 15 presents these data.

Only 13% of the teachers felt that marine education was not relevant to their students' situations. The primary reasons given for its educational relevance were: (1) geographic proximity to the marine environment, (2) its general importance to everyone, (3) its relationship to environmental education, and (4) students' backgrounds and future options. Grade 9 teachers placed more emphasis on the academic reasons for teaching about the ocean while grade 5 teachers were more concerned with the practical realities of their students' situations (Figure 16).

Finally, teachers were asked for their opinions on how marine education would best be taught (i.e. as a separate course, integrated with other educational disciplines, or as a means for teaching concepts of resource management). The majority of teachers felt marine education should adopt an integrated approach (Figure 17).

DISCUSSION

The data presented here are partial and preliminary findings. We will be analizing these data further and their implications for Canadian schools, marine resource institutions, marine sanctuarys and parks will be helpful in initiating programs which direct

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Canadians future relationships to the oceans.

The results of both the student and teacher surveys clearly confirm the need for more to be done in marine education. Teachers acknowledge this (Figure 12 - 13) and the students low knowledge scores also point to such a need (Figure 1).

Presently there are very few marine curriculum materials being used by Canadian teachers (Figure 13) and the effectiveness of those that do exist may be questioned as they do not appear to relate to any increase in students' knowledge about the sea. Low knowledges scores by french-speaking student also indicate a lack of quality marine education materials in that language. From the present survey, unless substantial changes occur, it is evident that future Canadians will know little about the oceans.

The need for improvement is evident and is perceived by teachers. But also there is a very high level of interest by both students and teachers in marine education. Students indicated positive attitudes towards the ocean and marine wildlife and revealed a desire to learn more about them. While childrens' interests alone may not be evidence of an educational need, they do represent a natural source of motivation to learn. Their high interest in the marine environment can be capitalized on to develop concepts in math, science, music, geography, etc. Marine topics can be used to infuse interest in teaching of many desciplines.

Such an integrated approach to teaching is exactly the method suggested by the majority of teachers for introducing marine concepts and issues. This raises the question as to the age or grade at which marine education is most appropiately introduced.

For most of Canada, a multi-disciplinary and integrated approach to teaching is only feasible at the primary and elementary school level. Grades 7 - 12 tend to be structured in terms of individual disciplines, each one handled distinctly from the others. From this and from the answers on the survey given by grade 5 and 9 students it appears that marine education in schools will be most effective at the primary and elementary school level.

Children in grade 5 show much less polarized views about resource management concerns than those in grade 9. The younger students are still exploring feelings about how they fit into the world of living things and different places. The data in this survey suggest a greater openness and a better ability to understand and accept a range of perspectives on marine issues.

Educational needs and interests should not have to be addressed exclusively by the formal school system. Environmental education television programs and environmental magazines clearly enhanced childrens' understanding of the ocean. Public aquariums and direct experience of the marine environment were extremely positive sources of information for the students surveyed. The

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most decisive single factor in enhancing knowledge about oceans was if the student had participated in a field trip to a marine or aquatic environment.

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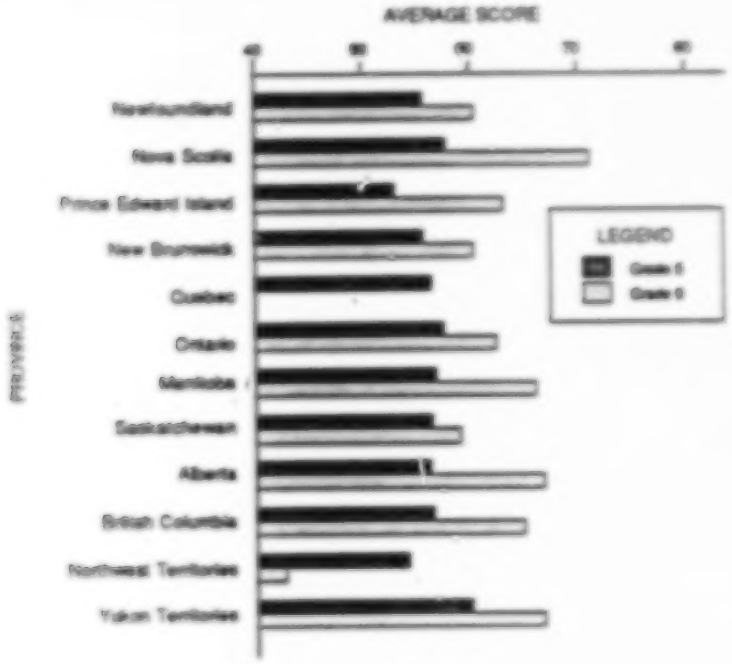
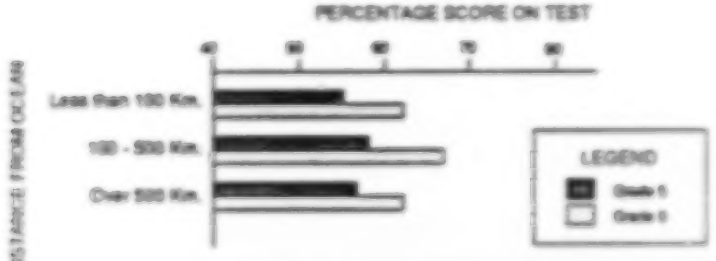
Figure 1:
Knowledge Scores by Province



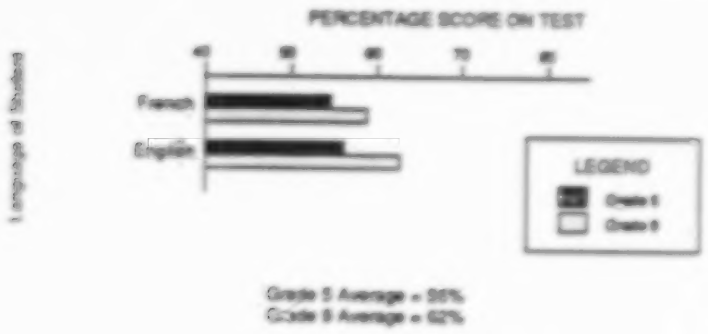
Grade 5 Average = 56%
Grade 9 Average = 62%

Figure 2:
Knowledge Scores and Distance from the Ocean



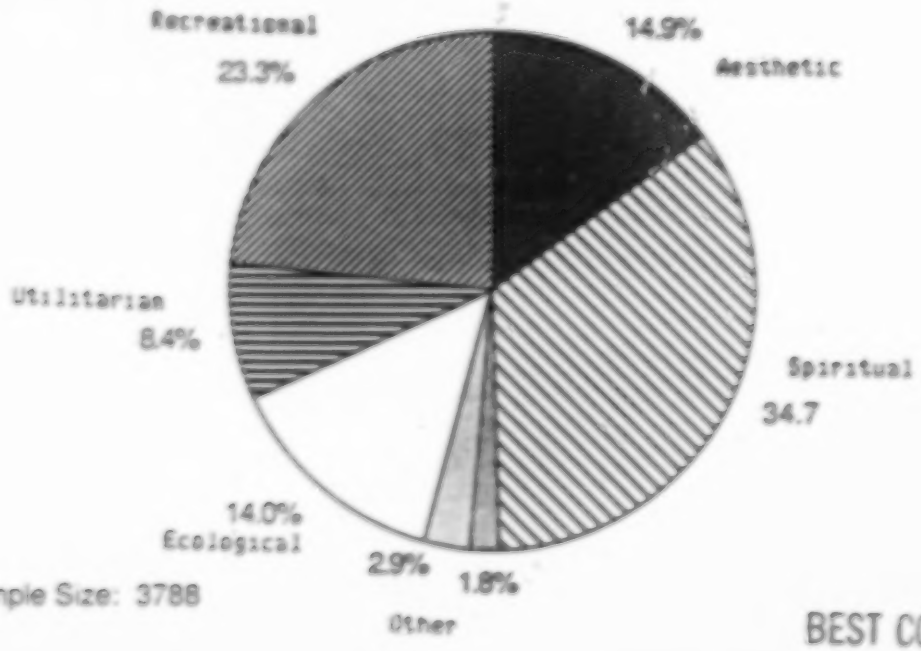
Grade 5 Average = 56%
Grade 9 Average = 62%

Figure 3:
Knowledge Score and Language



Grade 5 Average = 55%
Grade 9 Average = 62%

Figure 4:
Canadian Students' Orientation towards the Ocean



Sample Size: 3788

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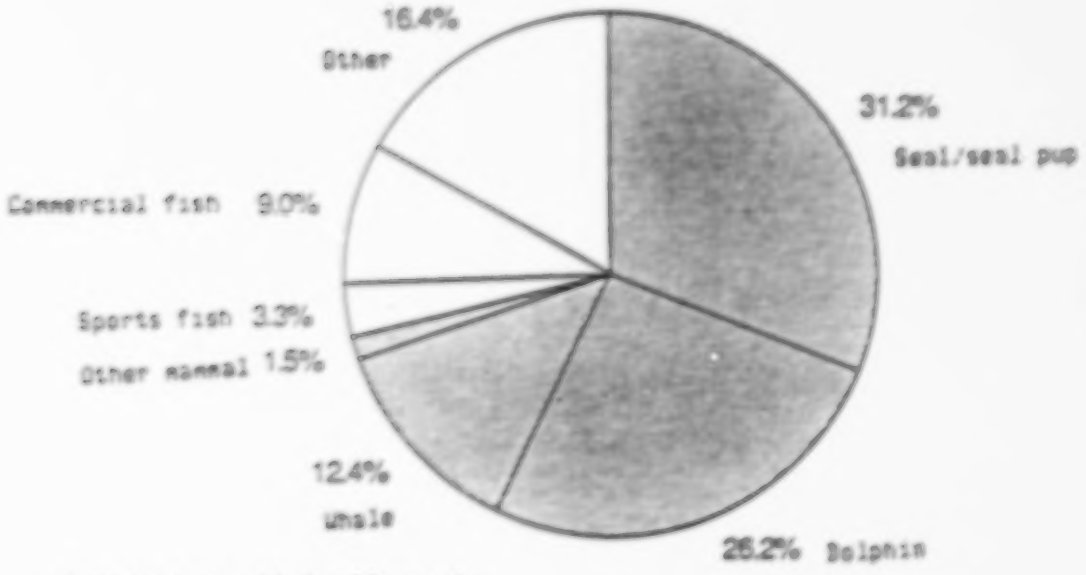
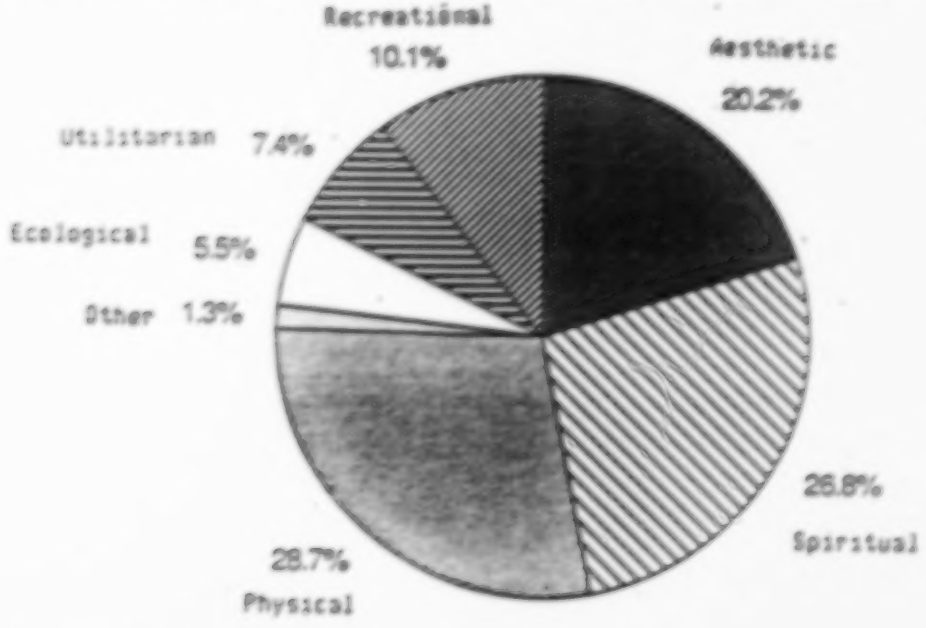
Figure 5:
Canadian Students' Favorite Sea Animal



Shaded Area = Marine Mammals

Figure 6:
Canadian Students' Orientations towards Marine Wildlife



Sample Size: 3648

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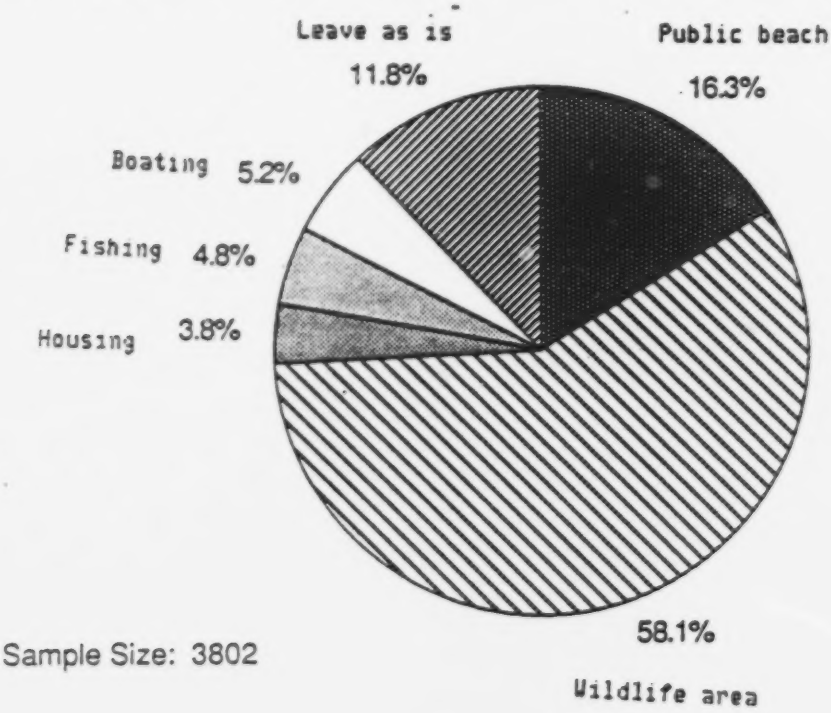
Figure 7:
Canadian Students' Orientation towards Coastal Zone Development



Sample Size: 3802

Figure 8
Students' Attitudes towards Marine Issues by Grade

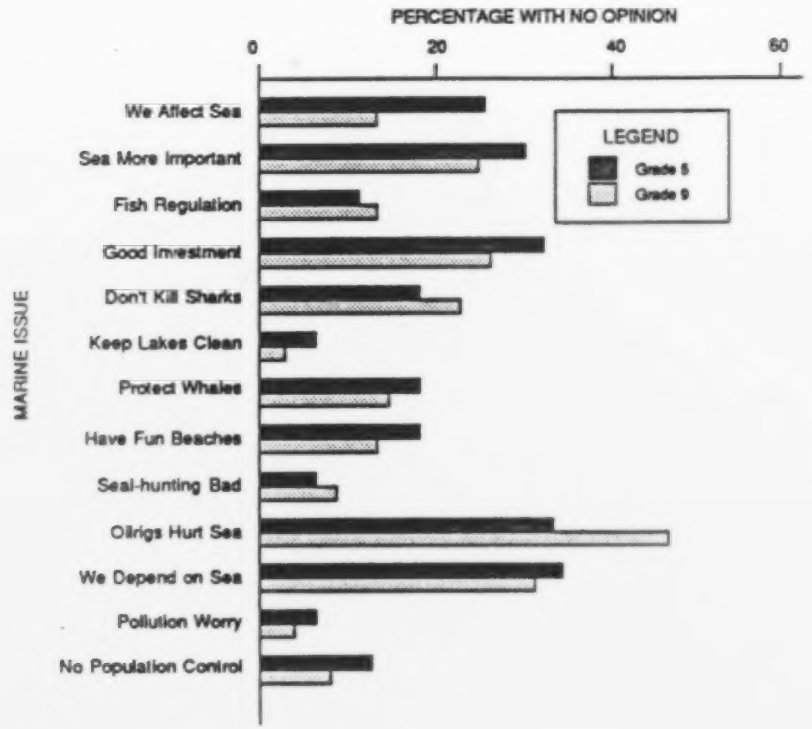


Figure 9:
Students' Attitudes towards Marine Issues.(By Distance from Ocean)

Figure 10

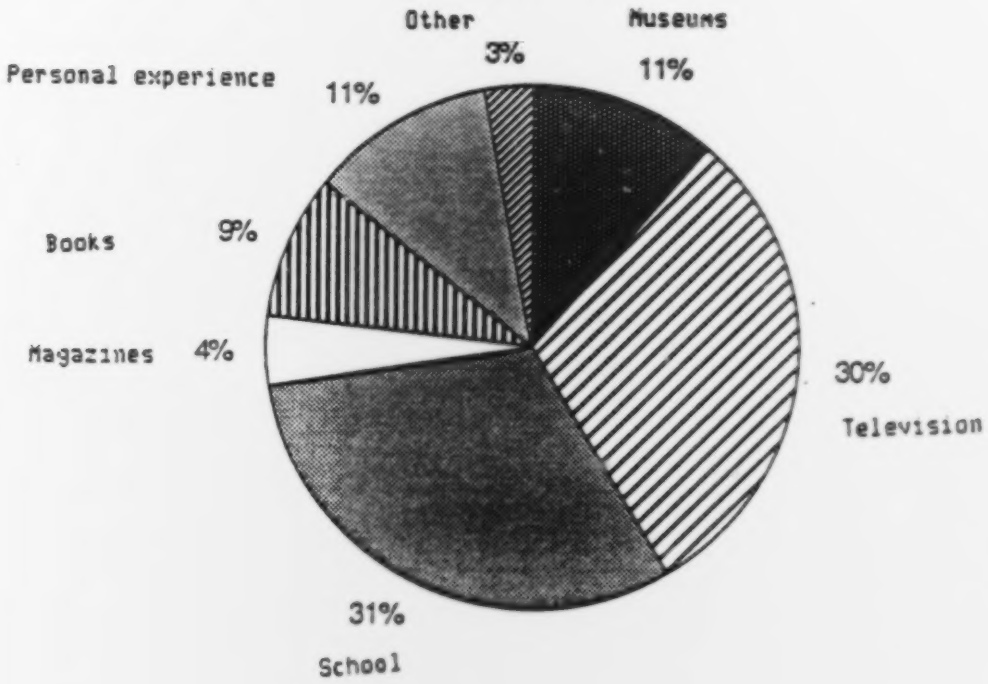


Figure 11.:
Teachers' Activities & Concerns

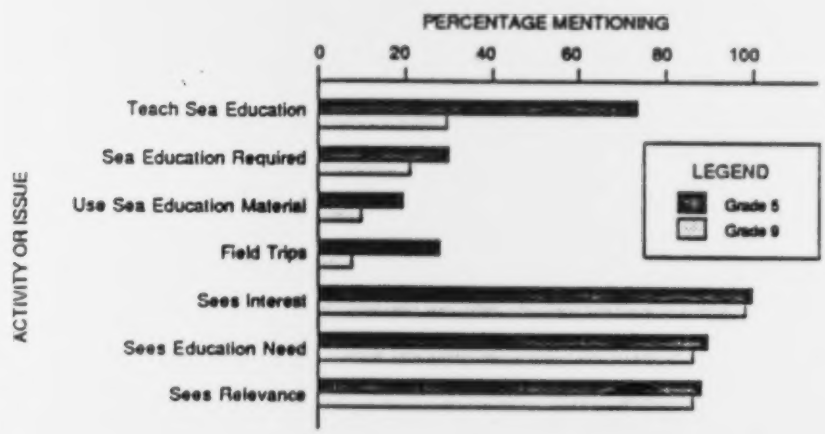


Figure 12
"Why is Marine Education Relevant to Canadian Students?"